INSTRUCTION MANUAL

TYPE 110

VIDEO MULTIKEYER

VISTA SYSTEMS inc

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SECTION 1

TYPE 110 VIDEO MULTIKEYER SPECIFICATIONS

1.1 GENERAL DESCRIPTION

The Vista Systems TYPE 110 MULTIKEYER is an eight-level video keyer with fully adjustable keying thresholds. The key source may be any video or audio waveform, with keying occurring on variations in key-source scene brightness or audio level. Up to eight independent insert sources may be used, including colorizers, other video or audio signals, and the key source signal. Striking graphics can be produced rapidly and inexpensively from simple monochrome sources.

The TYPE 110 integrates easily with any television production system, or can be used as a stand-alone device with minimum ancillary equipment. Maximum versatility can be achieved in conjunction with a Vista Systems TYPE 310 QUAD COLORIZER and a Vista Systems 210 VIDEO MIXER.

1.2 ELECTRICAL SPECIFICATIONS

The following performance is provided without warmup at any ambient temperature between +10°C and +50°C.

Characteristic	Performance
Frequency response of insert channels.....	Within ± 0.5 dB from DC to 5 MHz.
Differential gain, insert channels.....	Within ± 5%, black through white
Differential phase, insert channels.....	Within ± 3°, black through white
Insert select time.....	Less than 50 nanoseconds
Insert rise time.....	Less than 20 nonoseconds
Insertion loss.....	Less than 1 dB

For proper operation, the following electrical terminal conditions must be observed.

Terminal Characteristic	Condition
Key source signal	Any video or audio signal having a peak-to-peak amplitude greater than 0.1 volts and less than 1.5 volts into 75 ohms.
Output signal load impedance	75 ohms within ± 10%
Gate input signals	Any video or audio signal having a peak-to-peak amplitude less than 1.0 volts, a maximum positive peak level less than +0.7 volts, and a maximum negative peak level less than -0.3 volts.
Drive signals required	Composite sync, blanking, and subcarrier at EIA standard levels.

The TYPE 110 presents the following electrical terminal conditions:

Terminal Characteristic	Condition
Impedance, all inputs	75 ohms within 5%
Output impedance	Low, terminate in 75 ohms
Output signal	Composite NTSC video, 1 volt peak-to-peak into 75 ohms.
AC power requirement	10 watts, nominal
Rear panel connector types	BNC
Front panel connector type	Switchcraft "Tinijax", Type 41
Drive signal input impedance	At least 1K, looping

SECTION 2

INSTRUCTIONS FOR USE

2.1 INTERCONNECTION

The TYPE 110 VIDEO MULTIKEYER operates with standard non-composite video signals as inputs, and produces two identical composit video signals at its outputs. EIA standard sync, blanking, and subcarrier drive signals must be connected to the TYPE 110 at rear panel jacks. These inputs are looping, and must be terminated in 75 ohms for proper operation. The pulse amplitudes must be 4 volts within 0.2 volts into 75 ohms. The subcarrier amplitude must be 2 volts within 0.2 volts into 75 ohms.

For most usage, all inputs will be non-composite video, either camera picture signals or full-field color signals from a colorizer. Audio or other signals can be fed to any of the TYPE 110 GATE INPUTS so long as the signal level does not exceed 1.5 volts peak-to-peak and the average level does not exceed +1.5, -0.5 volts. Signals not synchronized with the drive pulses can be connected to the TYPE 110 CONTROL INPUT only if they are synchronously blanked or the input clamp is disabled.

2.2 OPERATION

The relationship among the gates and threshold controls which is basic to the operation of the TYPE 110, is shown in Fig. 1-1. The video waveform shown would produce a monochrome picture which is a black strip at the left edge, proceding through the full gray scale to maximum white on a line just to the right of picture center, then back through the gray scale to a black strip at the right edge. In Fig. 1-1 gate is open between thresholds A and B, and a red signal is conducted through gate 1 to the output bus. When the CONTROL INPUT signal level rises above threshold B, gate 2 opens shutting gate 1 off, and a blue signal is conducted through gate 2 to the output bus. Whenever the CONTROL INPUT video rises above a threshold, the gate associated with this threshold is opened and all gates associated with thresholds which are lower alphabetically (knobs to the left on the front panel) are automatically closed.

This operation creates a new picture which is based on the structure of the picture at the CONTROL INPUT, but which is entirely composed of other picture elements which are inserted into picture areas corresponding to intervals of brightness in the CONTROL INPUT picture.

Rotation of a threshold knob CW raises the level of that threshold so that its associated gate is opened by brighter regions of the picture. This gate will be open for all regions of the picture brighter than its threshold unless a gate to its right is opened. Any gate which is open closes all gates to its left regardless of whether the CONTROL INPUT brightness is above their threshold.

SECTION 3

CIRCUIT DESCRIPTION

The Vista Systems TYPE 110 MULTIKEYER is an eight-level video keyer with adjustable thresholds. A block diagram of the unit is shown in Fig. 3-1. The Multikeyer operates as a high-speed video switch with 8 source inputs and 1 output. Only 1 input is connected to the output at any one time. Source selection is determined by comparison of the instantaneous amplitude of the video control signal and the settings of the threshold controls. If the instantaneous voltage of the video control signal is higher than the threshold voltage of a comparator, the comparator output is approximately 4 volts (TTL logical 1). If the video control voltage is less than the threshold, the comparator output will be approximately 0.3 volts (TTL logical 0). Since the video control voltage can be higher than more than one comparator threshold, all comparator outputs are connected to eight 8-input nand gates which permit only one gate to be opened at any one time. The results is a new picture in which bands of brightness in the video control signal picture are replaced by bands of color or other pictures gated in through the source inputs.

As an example, consider a picture signal taken from an eight-step gray-scale test chart. If this signal is connected to the control input of the TYPE 110, and signals representing different solid color fields are connected to the eight gate inputs, the thresholds can be adjusted so that the newly created picture will be made up of eight different areas of color, each corresponding to one of the eight shades of gray in the original picture. If desired, other pictures can be connected to any of the eight gate inputs, resulting in a mixture at the output of colored areas and portions of the other pictures.

After leaving the 8-level gate, the processed non-composite video signal is available as an output or is conducted to the black-burst adder section where it is clamped, blanked, and added to sync and burst to form a composite video signal.

Each comparator is a Type 710 high-speed differential comparator. The digital 8-input NAND gates are Type 74H30 and the video gates are RCA, Type CA3039. Two integrated circuits, Type 74H04 each containing 6 inverters of which 4 are used, provide balanced switching signals to the CA3039 diode array video gates.

The comparators are driven in parallel from an input clamp and FET source-follower buffer. This permits keying of the TYPE 110 by signals with substantial DC offset voltages. Clamp transistor Q6 is switched on and off by inverted sync pulses from sync inverter Q101. The inverted waveform causes Q6 to conduct with an impedance of approximately 200 ohms to ground during sync pulses. At all other times, Q6 presents a very high impedance to ground. The incoming video signal is shorted to ground during sync, but conducted at all other times to the gate of Q5 without attenuation. The extremely low gate current of Q5 causes no change in the DC level of the clamped waveform between clamp pulses so that no sag or tilt occurs.

The black burst adder includes a clamp, Q104, which is driven by inverted sync pulses from the sync inverter, Q101. Q104 provides an impedance to ground of approximately 200 ohms during the period of the sync pulse, and of many megohms at all other times. The clamp amplifier consists of Q103, Q105, and Q106 in a feedback configuration. Q103 provides a very-high input impedance to clamped signal, inverts the video signal, and provides a gain of approximately unity because of the negative feedback introduced at its source terminal. Q105 restores the video signal to its normal polarity and provides a gain of about 3. Emitter follower Q106 provides a low-impedance output which supplies feedback current through 270 ohm resistor to the source of Q103 and signal current to the 2.5K ohm video level control. The 500 ohm potentiometer in the drain circuit of Q103 permits adjustment of dc offset through the amplifier to 0 volts.

Following the clamp amplifier is IC101, a Motorola Type MC1445L high-speed analog two-channel switch which is used as a video blanker. This device has a video gain of about 10. The video signal amplitude at its output should be approximately 1.6 volts p-p. The exact amplitude is that necessary to produce a blanking-to-peak-white amplitude at the composite video output of .7 volts when properly terminated. The 100 ohm trim pots adjacent to this circuit are for adjustment of blanking dc level and black dc level which should be measured at the composite video output and set to 0 volts and 0.05 volts respectively.

The color burst is generated in IC104, a MC1445L high-speed analog switch which is driven by IC103, a monostable multivibrator (one-shot) type MC8601P. This device provides the burst gate flag, the width of which should be set to 2.5 microseconds by adjustment of the 2.5K ohm pot adjacent to the device.

The width of back porch is controlled by the 2.5K ohm pot adjacent to IC102, the burst delay generator, and should be set to 0.5 microseconds. The sync inverter triggers the burst delay generator on the trailing edge of sync; the burst delay generator triggers the burst gate flag generator on the trailing edge of back porch, and the burst gate flag generator opens the burst gate. Burst is added to the composite video signal through emitter follower Q102 and a 560 ohm resistor. Burst amplitude should be measured at the composite video output, and set to 0.28 volts peak-to-peak into a 75 ohm load. This adjustment is made with R133, the 1K ohm pot adjacent to the MC1445L burst gate IC.

Sync is added to the composite video signal through emitter follower Q109 and a 560 ohm resistor. Sync amplitude should be measured at the composite video output, and set to 0.28 volts by adjustment of R124, the 1K ohm pot adjacent to Q109.

POWER SUPPLY

The power supply drives +11, +3.8, -1.8, -9 volts from a single floating source. The full-wave rectifier and capacitor filter produce approximately 26 volts which is not referenced to ground within the transformer or rectifiers. Ground reference is achieved by a dynamic voltage divider consisting of IC4, an active voltage regulator, and a 560 ohm load resistor. The output terminal of this regulator is tied to ground and its negative reference terminal to the negative side of the floating source. IC4 regulates the amount of current flowing from the negative side of the floating source to ground so that the negative side of the floating source is maintained at 9 volts below ground. The +11 and +3.8 volt regulators are conventional series regulators utilizing Motorola MFC6030A regulators and Motorola MPS-U01 pass transistors. Current must flow into rather than out of the -1.8 volt terminal, so the pass transistor is a Motorola type MPS-U51 connected in a shunt configuration and controlled by IC3.

SECTION 4

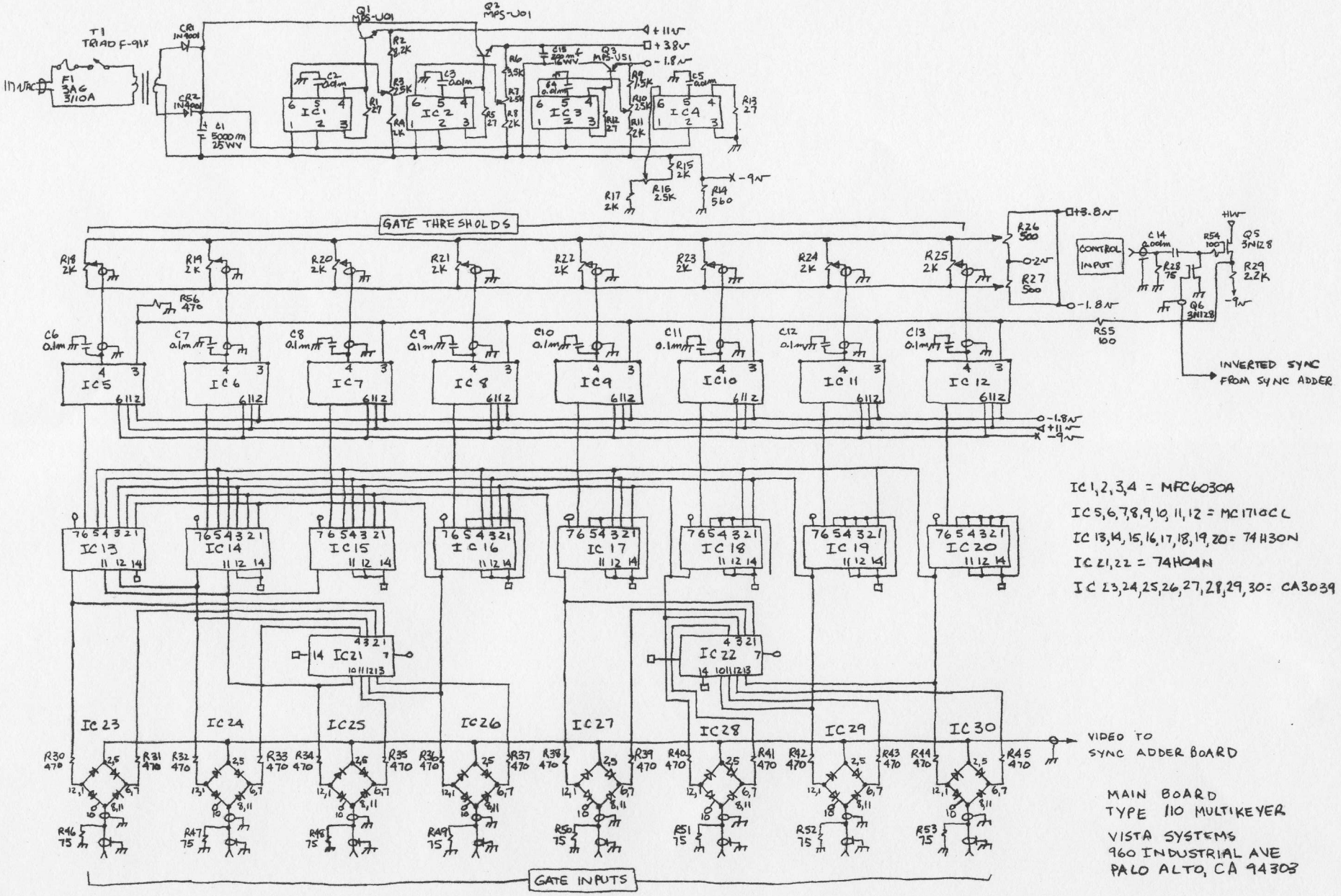
MAINTENANCE

4.1 SETUP AND ADJUSTMENT

Multikeyer setup should begin with adjustment of the power supply voltages. First, adjust R16, the pot adjacent to IC4 (the second IC from the left in the regulator row) so that the voltage on the 11 volt rail is correct. Then adjust the voltages on the +3.8 and -1.8 volt rails in a similar manner. Repeat this sequence to eliminate effects of interaction among the various regulators. Then adjust the threshold limit controls so that the positivie bus supplying the threshold controls on the front panel is at +2.0 volts and the negative bus is at +0.5 volts. These controls are the two small trimpots located between the power supply section and the row of type 74H30 NAND gates. After completing this adjustment, recheck the power supply voltages and adjust as necessary.

proceed to the video section of the black-burst adder board. Inject a non-composite video signal into the rightmost gate input connector, and rotate all threshold controls to a fully-counterclockwise position. The video signal should be noncomposite with a peak-to-peak amplitude of approximately 0.7 volts. At this time sync, blanking and subcarrier signals should be supplied to the Multikeyer as for normal operation, including appropriate terminations. Check for presence of video, sync, blanking, and burst at the composite video output. If any of these are missing, begin si signal-tracing procedures to isolate and correct the malfunction. If all are present, adjust R109, so that the output video voltage is reduced to 0 volts.

Adjust R111 so that the output blanking level is 0 volts. Adjust R112 so the output black level is 0.05 volts. Adjust R109 so that the output video level is 0.7 volts, peak white to blanking. Adjust R104 in the drain circuit of Q103 so that black level is 0.05 volts. Readjust the video level control if necessary to achieve the proper video voltage at the output. Adjust R124 to provide 0.28 volts of sync at the output. Adjust R133 to provide 0.28 volts peak-to-peak of burst at the output, and adjust the burst timing controls to provide 0.5 microseconds back porch and 2.2 microseconds burst width. The Multikeyer is now ready to use.



IC 1,2,3,4 = MFC6030A

IC 5,6,7,8,9,10,11,12 = MC1710CL

IC 13,14,15,16,17,18,19,20 = 74H30N

IC 21,22 = 74H04N

IC 23,24,25,26,27,28,29,30 = CA3039

MAIN BOARD
TYPE 110 MULTIKEYER

VISTA SYSTEMS
960 INDUSTRIAL AVE
PALO ALTO, CA 94303